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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/005,843	12/07/2001	Hee Youl Lee	054216-5005	1070

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EXAMINER

BEREZNY, NEAL

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 06/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/005,843

Applicant(s)

LEE, HEE YOUL

Examiner

Neal Berezny

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 6 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In claim 6 the oxide and the first capping layer are etched through to the second capping layer, but the second capping layer is over the first capping layer. The specifications fail to teach how such a step is achieved.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 1, the first limitation recites forming a

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patterned tunnel oxide, floating gate, etc., but it is not clear, if just the tunnel oxide is patterned, or is the entire stack patterned?

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu et al. (6,482,699) in combination with Applicant's Admitted Prior Art (AAPA). Hu teaches a method of manufacturing a semiconductor device, comprising the steps of: forming a patterned tunnel oxide film, a floating gate electrode, a dielectric film, and a control gate electrode in a cell region of a semiconductor substrate; fig.2c, el.212, 214, 216, 218, 210a, forming a gate electrode in a peripheral circuit region of the semiconductor substrate; fig.2c, el.210c, removing an exposed portion of a device isolation film in the cell region by a self-align source etch process; fig.2c, col.6, ln.12-14, forming a first capping layer and a second capping layer on the semiconductor substrate; fig.3a, el.230, fig.3b, el.231, col.6, ln.55-59, performing a self-align source annealing process for the cell region; col.6, ln.27-30, forming a source and drain junction in the cell region; fig.3b, el.202ab, 204b, forming a gate spacer in the peripheral circuit region; fig.3b, el.210c, forming a high concentration source and drain junction in the peripheral circuit region; fig.3b, el.202c, 204c, wherein a thickness of the second

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capping layer is 50-150A; col.5, ln.60-66, and wherein the first capping and the second capping layer prohibit formation of a local bird's beak of the dielectric film formed between the floating gate electrode and the control gate electrode, fig.3a, 3b.

8. Hu appears not to specifically teach the use of forming a low concentration source and drain junction in the peripheral circuit region; nor wherein a thickness of the first capping layer is 100-200A. AAPA teaches the formation of a low concentration source and drain junction in the peripheral circuit region, p.3, ln.13-15. It would have been obvious to one of ordinary skill in the art at the time of the invention to form an LDD structure in the peripheral circuit region so as to reduce the hot electron effect, thus increasing the performance and life of the device. Further, it would have been obvious to one of ordinary skill in the art at the time of the invention to form a first capping layer with a thickness of 100-200A, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Applicant has not demonstrated the criticality or unexpected results arising from the specified dimensions.

9. Claims 4-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu and AAPA as applied to claims 1-3,10 above, and further in view of Tran et al. (6,455,362) and Gardner et al. (6,323,519). Tran teaches the use of gate spacers, wherein the gate spacer is formed of the first capping layer, and an oxide film by a blanket etch process; fig.13, el.34, 72, and wherein the high concentration source and

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drain junction in the peripheral circuit region is formed by using a lateral portion of the first capping layer etched as an ion implantation screen oxide film, fig.12, el.72, 104.

Gardner teaches a gate spacer also including the second capping layer; fig.18, el.60, 58, 54, 52, wherein the oxide film and the first capping layer are etched through to lateral portions of the second capping layer to form a screen oxide film; fig.17, el.52, 54, 56, wherein the source and drain junction in the cell region is formed by using the first capping layer and the second capping layer as an ion implantation screen oxide film; and wherein the low concentration source and drain junction in the peripheral circuit region is formed by using the first capping layer and the second capping layer as an ion implantation screen oxide film, fig.15, el.24, 34, 48.

10. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Tran and Gardner with Hu and AAPA in order to construct transistors with LDD structure, in which the offset between the low and high doped regions is controlled with multiple layers of spacers so as to create narrow LDD regions, resulting in decreased series resistance and increased saturation drain current, whereas thicker nitrided spacers would help prevent dopant outdiffusion, and prevent silicide bridging, see Gardner, abstract.

11. Further, it would have been obvious to one of ordinary skill in the art at the time of the invention to form an oxide film with a thickness of 1200-1600Å, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re*

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Aller, 105 USPQ 233. Applicant has not demonstrated the criticality or unexpected results arising from the specified dimensions.


Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Neal Berezny whose telephone number is (703) 305-1481. The examiner can normally be reached on M-F 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

NB
May 29, 2003


Olik Chaudhuri
Supervisory Patent Examiner
Technology Center 2800